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MUSKMELONS



MUSKMELONS, most of which are referred to as “cantaloupes” by the trade, are grown commercially and for home use over a wide range of territory in the United States.

The essentials for the production of good melons are a relatively long growing season, with plenty of moisture during the growing period and bright sunshine at the time of maturity. The crop can be grown on almost any well-drained fertile soil, but does best on rich sandy loam and on light alluvial soils.

Muskmelons attain their highest flavor and quality only when produced on disease-free vines and where they are allowed to become practically ripe before being removed from the vines. Melons picked at the stage termed “half slip” can be shipped across the country under refrigeration and still allow time for prompt marketing.

The production of muskmelons for carload shipment is now a highly specialized industry. There is an excellent opportunity for the local growing of high-quality melons for sale on special markets and at roadside markets.

MUSKMELONS

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IMPORTANCE OF THE INDUSTRY

MUSKMELONS, usually referred to as “cantaloupes” by the trade, are shipped in car lots from nearly half of the States of the Union, and some additional States produce the crop in considerable quantities for the market. California leads with somewhat more than half of the total shipments. Other States with large commercial production are Arizona, Colorado, Georgia, North Carolina, Maryland, New Jersey, and Arkansas.

Under present conditions the car-lot markets are well supplied, and the demand is for improvement in the market quality and grade of the product. There is, however, a good demand for locally grown melons for sale at roadside markets and for supplying the smaller towns that do not receive carload shipments. The most urgent need in the large commercial melon-producing areas is for standardization of production and better methods of handling.

The muskmelon industry is at present fairly well distributed over the entire United States and parts of Canada, but the large shipping sections of the West are in California, Colorado, and Arizona, and the more eastern ones in Arkansas, Maryland, New Jersey, Indiana, Delaware, Michigan, North Carolina, and Texas. In nearly every section of the country suitable natural conditions for growing muskmelons are found in local areas, within which success is dependent mainly upon the skill and knowledge of the grower. The muskmelon industry of the United States has been seriously injured by the marketing of great quantities of melons that have been picked before reaching the proper stage of maturity. Melons that are properly matured and carefully handled give satisfaction, but immature stock reaches the markets with poor flavor and low quality and is a disappointment to the consumer.

Good seed of a desirable market variety, the judicious use of fertilizers, insect and disease control, and clean culture are essential to the production of high-grade muskmelons, but the proper maturity and handling of the product are of major importance.

CLIMATE

Muskmelons require a fairly long growing season, with plenty of heat and sunshine, a dry atmosphere, and sufficient soil moisture. As a rule 120 to 140 days of good growing weather are necessary for the production of muskmelons, but good crops are frequently grown in 90 to 100 days under especially favorable weather and soil conditions. The natural home of the muskmelon is in the hot valley regions of southern Asia, and the more important commercial producing sections of this country are located in regions having a similar climate. In addition to high temperature, the muskmelon requires an abundance of soil moisture from the time the plants start until the beginning of the ripening period. Bright sunshine with high temperature and dry atmospheric conditions during the ripening period are essential to the production of the best flavored melons. Where the water is supplied by irrigation, moisture conditions are practically under the grower's control; but in sections of natural rainfall continued showery weather during the growing period is conducive to the development of leaf diseases, which, however, may usually be controlled by spraying or dusting. Excessive irrigation or rainfall during the ripening period or immediately preceding it will cause the melons to be lacking in flavor and carrying qualities.

The climatic conditions in the Imperial Valley, in the Rocky Ford section of Colorado, and in many parts of the Eastern and Southern States may be included among the most desirable for muskmelon growing. The fact that muskmelons are produced for the market in carload lots in 22 States and in smaller quantities in at least 10 additional States indicates the range of climatic conditions under which the crop can be successfully grown.

SOIL

Muskmelons do best on well-drained warm sandy loam or silt-loam soils, but some of the finest melons are grown on sandy river-bottom lands and on rich clay loams. The large commercial crop produced in the Imperial Valley of California is grown mainly on what is known as the Holtville silty clay loam; that of Indiana, Illinois, and other of the North-Central States for the most part grows on light clay loams. The commercial crop of Colorado, Arkansas, Texas, Michigan, New Jersey, South Carolina, and southern Georgia is produced largely on sandy loams. Warmth, good drainage, and an abundance of rapidly available plant food with plenty of humus to retain suitable moisture are the essential requirements of a soil on which to grow muskmelons. They will not endure an overflow, and soils on which water will stand in the furrows after a rain or that wash badly are not suited for the crop. Muskmelons for home use may be grown on any good garden soil, provided the season is of sufficient length and climatic conditions are right.

ROTATION

Crop rotation has proved one of the most effective means for reducing disease infestation and maintaining proper plant food and physical conditions of the soil. A rotation in which the melon or some other related vine crop is not planted on the land oftener than once in five or six years is recommended. The crops employed in the rotation will depend upon the locality, but they should not include cucumbers or any of the vine crops that are subject to the same diseases as the muskmelon. In sections where root knot is prevalent special care must be taken to avoid planting cucumbers, tomatoes, and several other crops in the rotation with muskmelons. Land that has been in alfalfa or clover or in pasture for a period of years is most likely to be free from muskmelon-disease organisms.

Muskmelons should not, as a rule, follow a grain crop. In the western sections the best yields are obtained on old alfalfa land. Where alfalfa land is not available, annual cover crops, especially the legumes, are used as a substitute. In the eastern sections the best results are obtained on clover or alfalfa sod or on land that has been enriched by turning under annual legumes grown as cover crops. In the market-garden districts where alfalfa and clover are not extensively grown it is customary to plant muskmelons on land which has previously been in potatoes or sweet potatoes followed by a cover crop.

VARIETIES

Muskmelons grown for carload shipment consist mainly of the smaller, nearly round, heavily netted sorts of both the green and the salmon-fleshed varieties. This type has been selected (1) for its carrying qualities, due to its having a heavy protective netting and a firm flesh; (2) on account of its desirable size and shape, which adapt it to marketing requirements; and (3) for its superior quality when properly ripened on the vine. A secondary group of shipping melons includes the Casaba, Honeydew, and other of the semikeeping or winter muskmelons. In addition, there are a number of varieties suitable for shipping but which are grown mainly for home use and local marketing.

Special strains or subvarieties of muskmelons are produced by cross-pollination, either accidental or by artificial means, and through lack of permanence of certain characters these strains change rapidly and are soon replaced by newer sorts that appear more promising. Wherever a variety has become especially popular it has been divided along the lines of slight differences into many subvarieties or strains. Often these differences are so poorly fixed that they lose their distinctive characters in a few years.

No attempt is made in this bulletin to give an extensive or detailed classification of the varieties of muskmelons, but rather to group and briefly describe those that are at present most important from commercial and home-garden standpoints. The degree of quality referred to in the description of the different varieties is found only in fruit that has ripened on healthy vines retaining their leaves in good condition until after the melons have matured. Heavy netting is not necessarily an indication of good table quality but

apparently denotes good shipping traits. Many of the varieties best adapted for home use or local marketing lack carrying qualities and are not suitable for long-distance shipment.

The varieties of muskmelons are divided in this bulletin for convenience into two main classes as follows: Class 1, netted melons, including those varieties that constitute the greater part of car-lot shipments and those ordinarily grown for home use and for local markets; class 2, melons of the Casaba type, which may be marketed during the late summer or stored for winter use. The brief descriptions that follow are intended as an aid to growers in selecting the type and variety of muskmelon adapted to their particular locality and purpose. In making their own selections commercial growers should conform as closely as possible to the best accepted standard for the variety in question.

CLASS 1.—NETTED MUSKMELONS

A.—SHIPPING VARIETIES

(1) **Defender group.**—These varieties originated in Michigan. The individual melons are about the size of the Netted Gem, but taper toward each end more sharply than specimens of that variety. Melons of the Defender group, especially the earlier varieties, are moderately ribbed, with more or less netting on the ribs, but with bare sutures (stripes between the ribs). The rind is green; flesh deep salmon, thick, with small cavity, texture firm and fine, aroma high and musky, flavor sweet and distinct. Six strains or varieties are here described.

Defender.—Fruits medium size, oval, slightly ribbed, covered with gray netting. Flesh firm, fine grained, and of high flavor, retaining its rich, deep orange-yellow color and quality to the outer shell. This variety was selected for its thin rind and small seed cavity. (Fig. 1.)

Paul Rose (*Petoskey*).—Fruits medium size, oval, slightly ribbed, densely netted. The flesh when ripe is orange-yellow, thick, firm, sweet, and highly flavored. One of the earliest varieties of this group.

Admiral Togo.—Fruits small, oval, rather heavy netting; flesh thick, orange color, of good quality; has good shipping qualities; suitable for the home garden and local marketing. (Fig. 2.)

Burrell Gem.—Fruits medium size, oval in shape, 4 to 5 inches in diameter and about 6 inches long, tapering at ends; has well-defined ribs with a clearly marked suture; ribs heavily netted; flesh thick, rich salmon color, fine grained, and of spicy flavor; seed cavity small, giving the melon good shipping qualities. One of the important varieties grown in the Rocky Ford (Colo.) district. (Fig. 3.)

Hale Best.—Fruits oblong and varying considerably in size; well netted, cavity small; flesh salmon tinted and firm, flavor excellent; ripens somewhat earlier than Pollock 10-25. Hale Best is being planted extensively in the commercial producing sections, especially in California. A good home-garden variety.

Hoodoo.—Nearly round in shape and more completely netted than Defender; flesh deep orange and of good flavor. (Fig. 4.)

Hearts of Gold (*Improved Hoodoo*).—Fruits round to slightly oval and almost ideal in size, shape, and netting for shipping. Slightly ribbed with sutures; flesh thick, rich orange in color, fine grained, and of excellent flavor; seed cavity small and triangular in shape. One of the characteristics of the variety is that the fruits do not yellow in ripening but retain their natural green color, remaining firm for a considerable period after gathering. A late introduction and one of the most popular commercial and home-garden varieties. (Fig. 5.) •

(2) **Netted Gem group.**—Varieties of the Netted Gem series have been developed for the most part at Rocky Ford, Colo., and selected primarily for shipping qualities. The original oblong Netted Gem, with decided ribbing and bare sutures, has been changed into a globular melon, almost without ribs and

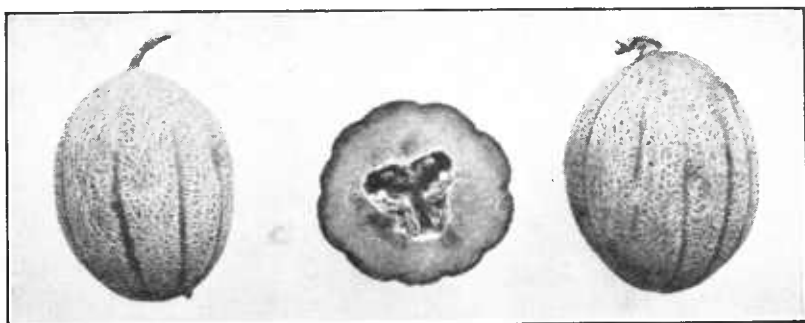


FIGURE 1.—Defender muskmelons

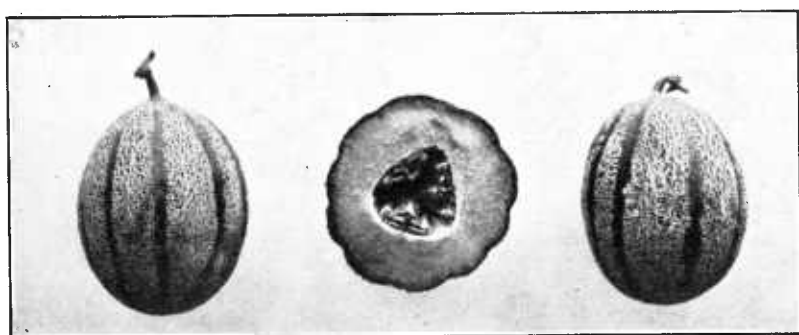


FIGURE 2.—Admiral Togo muskmelons

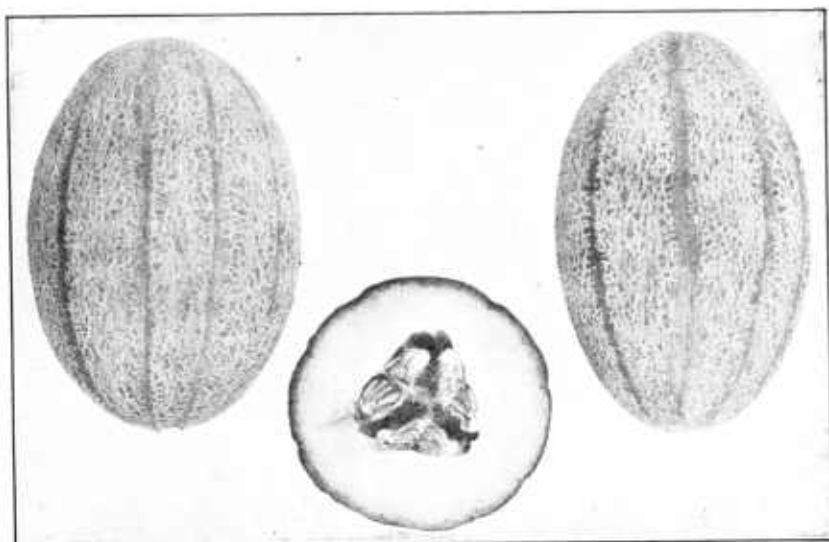


FIGURE 3.—Burrell Gem muskmelons grown in Colorado

solidly netted. This style of melon packs and carries better than the parent variety. Some of the selections or strains are described as follows:

Rocky Ford.—Not a distinct variety but a name given to melons of the Netted Gem type as developed in the Rocky Ford district. (See Fig. 12.)

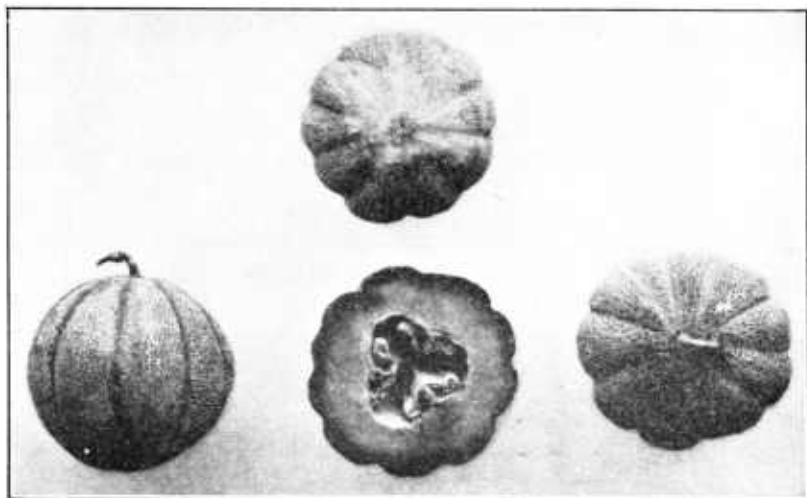


FIGURE 4.—Hoodoo muskmelons

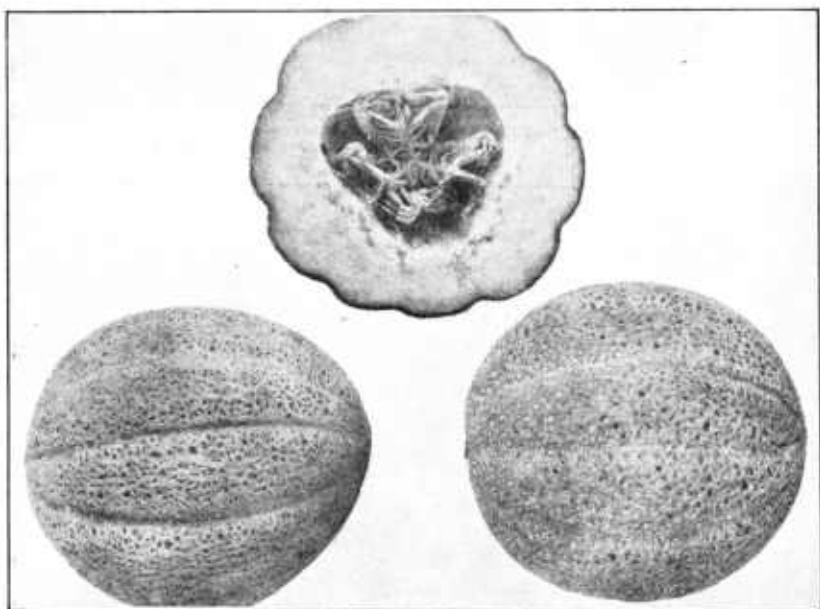


FIGURE 5.—Hearts of Gold (*Improved Hoodoo*) muskmelons

Pollock 25.—A selection made to meet the requirements of the Colorado muskmelon growers for a long-distance shipping melon of good quality and resistant to anthracnose or rust. Medium size, round or slightly oval in shape, little or no ribbing, heavily netted; flesh medium thick, a rich salmon-pink color on the inside, shading to a deep green near the rind; fine grained, very

solid, highly flavored; seed cavity small; vines not entirely rust resistant in sections having natural or excessive rainfall.

Pollock 10-25.—A selection from Pollock 25 to which it is similar except that the flesh is of a deeper salmon color on the inside, shading to green near the rind. Extensively grown in the commercial muskmelon districts of California.

Eden Gem.—Fruits medium size and of uniform shape, solidly netted; flesh thick, firm, and fine grained; color varying to light golden; of excellent flavor and reasonably resistant to rust. A good long-distance shipper.

Edwards Perfecto.—There are two types of this variety, one with flesh of salmon tint, a large oblong melon finely netted, and one with pink or red flesh, nearly round and completely covered with netting. One of the best shipping melons.

Abbott Pearl (Pearl Pink, Buckskin).—The fruit averages larger than Pollock 25. In shape it is almost round, slightly oval, but irregular in size. The exterior is whitish green, without ribs, and completely covered with coarse netting; flesh deep-salmon color to the rind, fine grained and firm, with good flavor; seed cavity small, making it a good shipper. This variety should not be picked from the vine until it will slip.

Honey Ball (Texas Honey Ball).—Probably a cross between Texas Cannon Ball and Honey Dew. Fruits slightly larger than Netted Gem; round, slightly netted, greenish white until ripe, then turning to a light yellow; flesh thick,

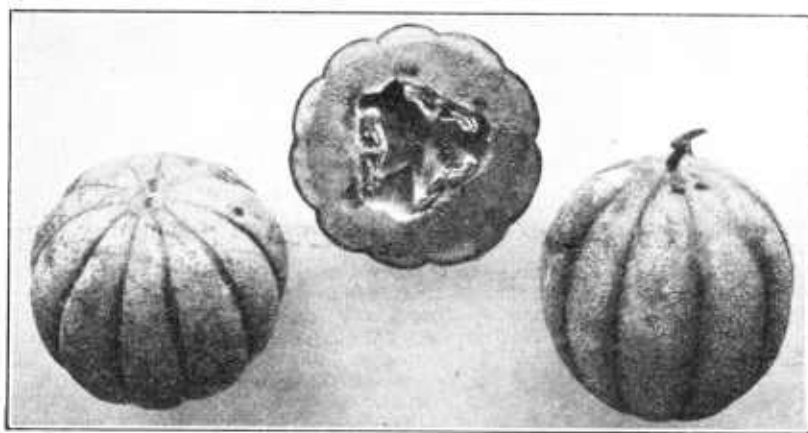


FIGURE 6.—Tiptop muskmelons

green color, sweet, and of delicious flavor; seed cavity small; melon firm and said to be a good shipper. Very prolific.

B.—HOME AND MARKET GARDEN VARIETIES

(1) **Tiptop group.**—This group includes some of the most important of the salmon-fleshed varieties of muskmelons, especially for home use and near-by marketing. Fruits large, sometimes 10 inches or more in diameter and weighing from 5 to 12 pounds. The fruits are globular or slightly oval in shape and have rather prominent ribs and usually scant netting. The outside color is greenish gray, becoming a light yellow when ripe. Flesh salmon in color, deep, of medium texture, high aroma, and fair to excellent quality. The following are among the most important varieties that compose this group:

Tiptop.—This variety is extensively grown in the North-Central States, especially east of the Mississippi River. Fruits medium size to large, weighing 5 to 8 pounds, slightly oval, ribbed, and well covered with light netting; flesh fairly thick; salmon to deep yellow in color, cavity rather large; an excellent melon for home use and local marketing. (Fig. 6.)

Surprise.—About the size of Tiptop and similar to it but more nearly globular.

Bender (Bender Surprise).—A selection from Surprise, to which it is very similar.

Baker.—A selection from Surprise, but having a heavier netting and said to be a better shipper.

Indiana.—Very similar to Tiptop.

Ohio Sugar.—Resembles Tiptop in size and general appearance, but has a light-green flesh with a slight pineapple flavor. (Fig. 7.)

Milwaukee Market.—Fruit deep fleshed, very uniform, large, and with shallow ribs. (Fig. 8.)

Irondequoit.—Fruit very large, well netted, weighing up to 10 and 12 pounds; suitable only for home use and special local marketing.

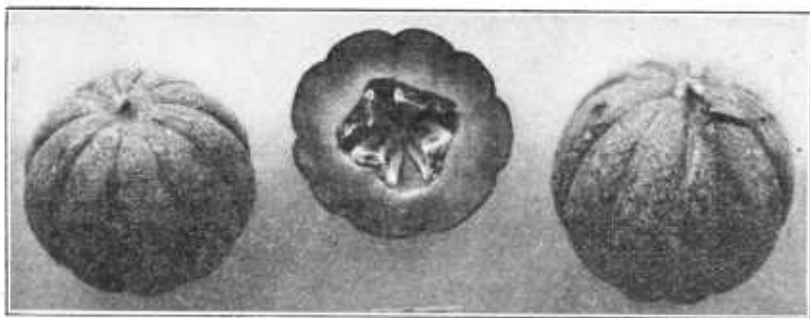


FIGURE 7.—Ohio Sugar muskmelons

(2) **Hackensack** (*Extra Early Hackensack; Turk's Cap*).—One of the best known older varieties. Fruits large, globular, sometimes slightly flattened, prominently ribbed, ribs of irregular width, covered with coarse netting; exterior color green, turning to slight yellow or decidedly yellow when ripened; flesh green, not very deep, medium to coarse, juicy and sweet. Grown only for special local markets.

(3) **Miller Cream** (*Osage*).—Fruits very large, globular or slightly oblong, usually 6 to 7 inches long, very solid, and weighing 5 to 6 pounds. Outside color green, ribs shallow, little netting. Flesh deep-salmon color, thick, good texture, high aroma and fine flavor; cavity small. The vines are vigorous and productive. An excellent variety for growing as a main crop in the eastern section. (Fig. 9.)



FIGURE 8.—Milwaukee Market muskmelon

(4) **Jenny Lind.**—Grown for many years in New Jersey for the markets of Philadelphia and the New Jersey coast. A small flat melon, about 4 to 4½ inches broad, flattened at the ends, and weighing 1½ to 2 pounds; ribs prominent, coarsely netted; blossom end of fruit having a scurred or warty appearance; cavity large; flesh thin, rather coarse grained, but with a pronounced aroma and very sweet flavor. (Fig. 10.)

(5) **Fordhook.**—A recent introduction. Fruits small, about 3½ inches long by 4½ inches broad and weighing 1½ to 2 pounds, flattened at the ends, with low ribs and fairly heavy netting; flesh moderately thick, good texture, salmon color, and with

a good aroma and flavor. Aside from the color of the flesh, it resembles Jenny Lind closely. (Fig. 11.)

(6) **Emerald Gem.**—Fruits of medium size, usually 5 to 6 inches in diameter and weighing 2 to 3 pounds; globular in shape; ribbing irregular and with little netting; color green; flesh very deep, of fine texture, deep-salmon color, with high aroma and good quality; very popular for home use and special local markets. With unfavorable weather at ripening time it splits badly at the blossom end.

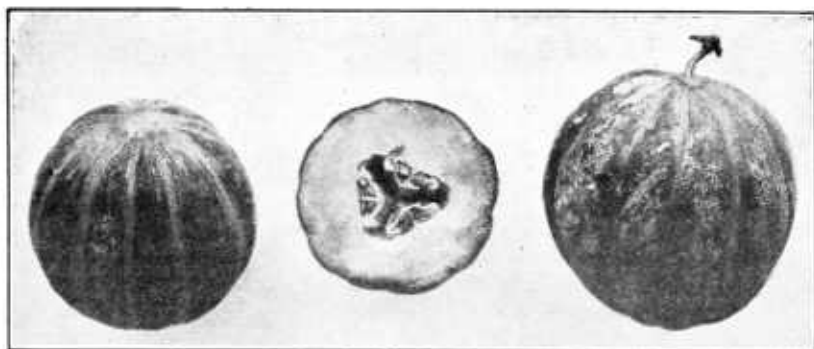


FIGURE 9.—Miller Cream (*Osage*) muskmelons



FIGURE 10.—Jenny Lind muskmelons

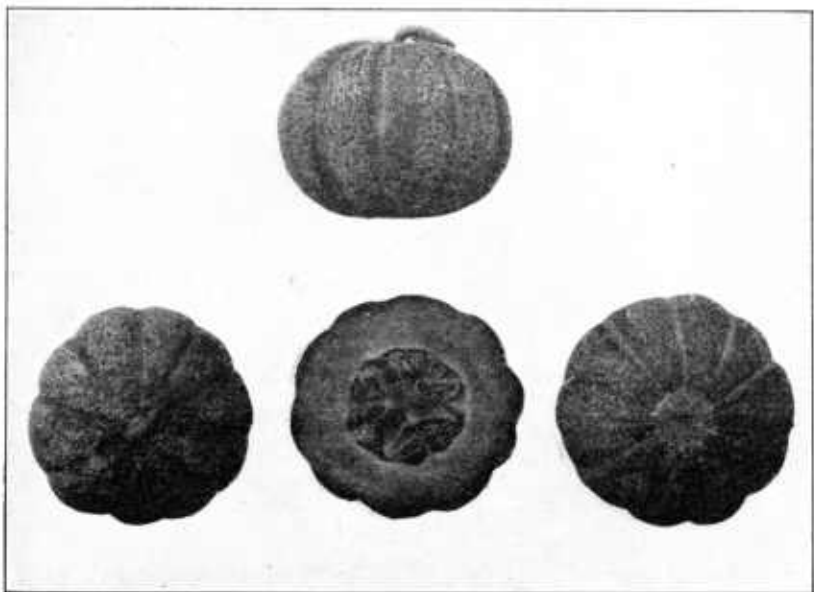


FIGURE 11.—Fordhook muskmelons

(7) **Netted Gem.**—This variety is often referred to as the Rocky Ford. It is the parent type of a number of the varieties now included in the largest commercial production of the Western States. In its original form it is not a good shipper, but it is higher in table quality than some of the varieties developed from it. For this reason it is largely planted in the East for home use and local marketing. The fruits are of medium size, 4 to 6 inches in diameter, and weighing from 2 to 3 pounds; slightly oblong, rounded at the ends, ribbed, and covered with fine netting; flesh green, medium thick, fine grained, with good aroma and flavor. (Fig. 12.)

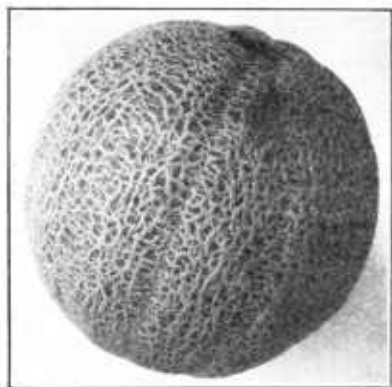


FIGURE 12.—Netted Gem muskmelon, commonly called Rocky Ford

(8) **Sweet Air (Knight).**—Similar to Netted Gem in size and shape except that the fruits are a little larger and a trifle more oblong; flesh rather thin, green, and having a very characteristic and decided aroma; grown extensively in the tidewater sections of Virginia and Maryland for local marketing. (Fig. 13.)

(9) **Montreal Market.**—Not grown to any considerable extent in the United States, but occasionally found on our eastern markets: globular, very large, diameter up to 12 inches, and weighing 15 to 20 pounds; deeply ribbed, coarsely netted; flesh thick, green, slightly coarse, but of excellent flavor; grown for local marketing or short-distance shipping, but it must be packed in excelsior for protection. As grown in the Montreal section the plants of this variety are

started and practically grown in hotbeds, the sash and frames being removed after the weather becomes warm. (Fig. 14.)

CLASS 2.—WINTER AND SPECIAL MELONS

The many varieties of class 2, comprising the Casaba, Honeydew, Christmas melon, and Santa Claus types, have been grown in Europe and Asia through a long period of time, but it is only within recent years that they have become

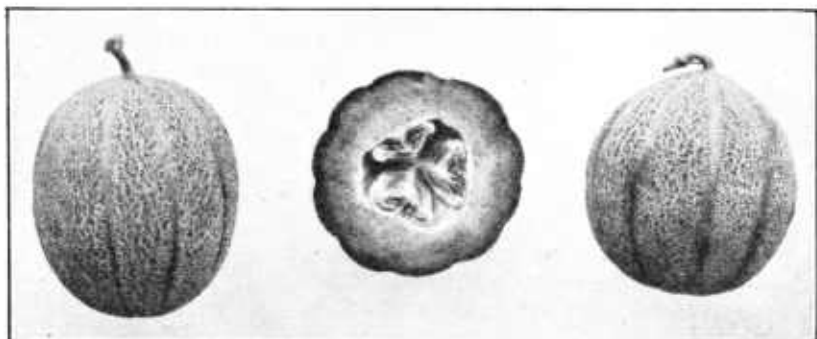


FIGURE 13.—Sweet Air (Knight) muskmelons

prominent in the United States. Owing to the fact that seed of the first variety of this class is said to have come from a town in Asia Minor, near Smyrna, the name Casaba has been taken as a trade name for the whole group. Melons of this class are native to the dry region of Asia Minor and Turkestan and are therefore best adapted for growing in the hot arid sections of the Western States. Occasionally good crops can be produced in the Eastern and Southern States, but not often enough to make them profitable commercially. Melons of this class should remain on the vines until reasonably ripe and then be re-

moved and stored in a cool, dry, well-ventilated place to complete their ripening. If not properly matured, they are lacking in flavor and sweetness and have a decided cucumber taste. The following are four of the varieties recognized in the American trade:

Golden Beauty (*Casaba*).—Fruits large, almost globular, 7 to 10 inches in diameter, weighing 6 to 10 pounds; rind whitish green, furrowed (not ribbed) lengthwise of the melon; no netting; flesh solid, white, texture fine grained, juicy, without aroma; flavor sweet and good when properly ripened. This melon, which formerly came upon our markets during the fall and early winter,

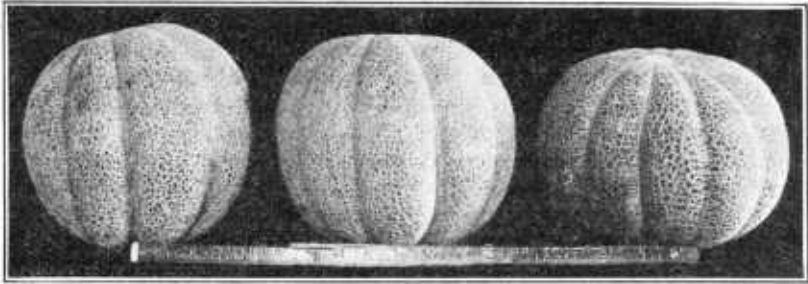


FIGURE 14.—Montreal Market muskmelons

is now being grown more universally and is marketed from midsummer until late fall or until after the Christmas holidays. *Casaba* melons are shipped in flat crates and protected with excelsior. (Fig. 15.)

Santa Claus (*Persian* or *Odessa*).—This is the latest and best keeper of the winter melons grown in this country. The fruits are oblong, usually 6 to 8 inches in diameter and 10 to 14 inches in length and weighing 8 to 12 pounds, often larger; rind green, very sparsely netted with broad bands; flesh very thick, fine grained, firm, white or light yellowish green, with a distinct aroma but no muskiness, flavor sweet and good when properly ripened. This variety is difficult to grow in the Eastern and Southern States and can be produced

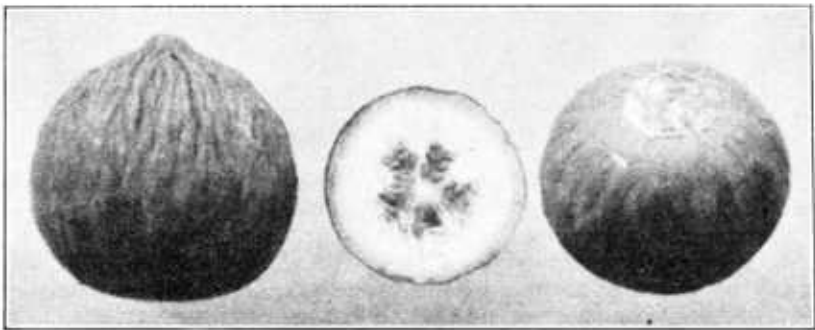


FIGURE 15.—Golden Beauty (*Casaba*) muskmelons

successfully in only the most favorable localities of the arid western sections. (Fig. 16.)

Honeydew.—This variety originally came from Europe, where it has long been known as *White Antibes Winter*. The average size is about 6 inches in diameter and 7 to 8 inches in length, weighing 5 to 6 pounds; the rind is smooth with an occasional net, greenish white, turning to a creamy yellow when ripe; flesh green, thick, fine grained, and of good quality and sweet when properly ripened; cavity medium size. This melon is not easily bruised and is an excellent keeper, but it should be shipped in crates with excelsior packing, the same as *Golden Beauty*. The *Honeydew* melon should not be planted near ordinary muskmelons or *Casabas* if seed is to be saved.

Banana.—The Banana variety does not belong to the winter group of melons, but it is listed here for the benefit of those who desire to grow it for the home garden or for special purposes. The fruits of this melon are usually 4 to 6 inches in diameter, 10 to 15 inches in length, yellowish in color when ripe, ribbed and without netting; flesh thick, juicy when properly grown, orange yellow to light salmon in color; it has a pleasing flavor and a distinctive odor. A closely related sort, greenish white in color, with mealy white flesh and poor quality, is often grown in the South for stock feeding.

SEED SUPPLY

Seed that is of pure strain, true to type, uniform, and of high vitality is the first essential to the growing of a profitable crop of muskmelons. Improvement through breeding and selection has been carried to a point where an ample supply of high-grade seed from selected stock may be obtained from dealers. Although much of the commercial supply is grown locally, great quantities of seed are produced within a limited area near Rocky Ford, Colo. The im-

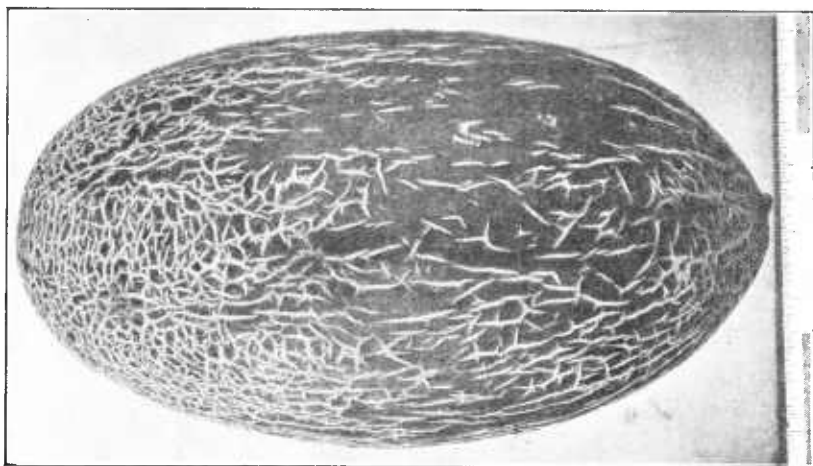


FIGURE 16.—Santa Claus (*Persian* or *Odessa*) muskmelon

provement in seed production in this region has been due largely to the demand on the part of associations of melon growers for seed of uniform strains, especially of types for long-distance shipment. The climatic conditions of the Rocky Ford section are especially adapted to growing melons of high quality and free from disease. Care must be taken in growing the seed to prevent the varieties mixing; in fact, but one variety should be grown in a locality. Contrary to general belief, muskmelons do not mix with cucumbers, pumpkins, or squashes, but they will mix with other varieties of muskmelons.

When grown for seed purposes the vines are carefully gone over at intervals, and all weak or diseased plants or those not true to type are removed. The melons from which seed is to be saved are allowed to become fully ripened on the vines and are selected from the standpoint of trueness to type and from high-yielding plants. The seed melons are gathered into piles and either hauled to a central point for extracting the seed or the work is done in the field. One method of extracting the seed is to cut the melons at the piles, collecting

the seed in pails, which are emptied into barrels on a wagon, as shown in Figure 17. Another method is by the use of a separating machine (fig. 18), which is driven directly to the field or else the melons are hauled to the machine at a central point. The seeds and their surrounding pulp are allowed to stand for a few hours in the barrels until fermentation proceeds to a point where the seeds settle



FIGURE 17.—Removing seeds from muskmelons in the field

to the bottom and the pulp floats to the top. The pulp is then poured off and the seeds washed with plenty of clean cold water. When large quantities of seeds are saved a special washing machine is employed. The seeds immediately after washing are spread thinly on trays having screen wire or burlap bottoms (fig. 19) and are stirred frequently to insure their drying quickly and evenly. After



FIGURE 18.—Machine for separating seeds from muskmelons

they are thoroughly dry they are bagged and stored in a well-ventilated room where they will not be molested by mice, rats, or other pests.

In saving small quantities of seed the usual method is to select uniform melons of the desired size and type from vigorous, disease-free, high-yielding vines at the time the crop is being gathered for the market. Each seed melon is marked by tying a piece of string

upon the stem. After these melons have become thoroughly ripened on the vines they are removed and kept for two or three days, so that the pulp surrounding the seeds will soften. Each melon is then cut in halves, the seeds being removed with the fingers, or the halves are given a downward jerk to extract the seeds, which fall into a pail, barrel, tub, or other wooden container. For very small quantities of seed a stoneware jar is suitable. The seeds are slightly fermented in their own juice without the addition of water and then are washed clean and dried, as already described. Growers who save their own supply of seed provide 2 pounds of seed for each acre to be planted. By doing so, a reserve supply is always on hand for replanting should it become necessary.

Commercial muskmelon growers, especially those who are members of associations, arrange for their seed supply well in advance, usually buying it through the association managers. Long experience has demonstrated the variety and strain that gives best results in each of the commercial localities, and it is desirable that the com-



FIGURE 19.—Muskmelon seeds drying on trays

mercial crop should always be planted from seed of a proved variety and strain which is in demand in that locality.

PREPARATION OF SOIL

Careful plowing to a depth of 7 to 10 inches sufficiently early in the season to permit the soil to settle thoroughly is essential to successful muskmelon growing. Land that is in sod or on which a cover crop has been grown the previous season should be plowed either in the fall or during the winter, in order that the rough material that is turned under may have a chance to decay. In sections of the South where bedding the land is practiced the bed should be made 5 to 7 feet in width with one row planted on each bed. In order to avoid having an unbroken space in the center of the bed, either the land should be rebudded two to four weeks after it is first plowed or a "bull tongue" should be run through the center of the bed to break up the soil that is not fully turned in plowing. A careful plowman in opening the bed can double-turn the first furrow in such a way as to break up the soil in the middle of the bed. Under normal conditions there is no advantage in bedding well-drained sandy loam soils for growing muskmelons, but on low

river-bottom or alluvial soils, where the water table is near the surface, bedding is essential. In parts of the Atlantic and Gulf region where excessive rains frequently occur during the early summer it is desirable to plow the land in 5-foot or 6-foot beds with open furrows between to give better drainage. In the North-Central States the land is plowed in the usual manner and the melons planted on the level, or, at most, on a slight mound or hill. In districts where the crop is grown under irrigation it is absolutely necessary to bed the land to conform with the practices of the section.

During the period between plowing and the time for planting the seed the land should be thoroughly cut with a disk harrow, and prior to planting it should be gone over with a smoothing harrow. A harrow of the type known as the Acme, which crushes, turns, and pulverizes the soil at one operation, is an excellent tool for the final preparation, though its use is not necessary on extremely loose or sandy soils, where an ordinary spike-tooth smoothing harrow will do the work.

MANURE AND FERTILIZERS

Muskmelons are a rapid-growing crop and require an abundance of plant food. If stable or feed-lot manure is used in the hills or beds it should be well decayed, but that produced by feeding hay from old melon fields should not be used because of its disease-carrying tendencies. In handling the manure it is a good plan to add 100 pounds of superphosphate (acid phosphate) to each ton, and 6 to 10 tons of manure per acre, where available, may be applied broadcast and harrowed into the soil. Where a manure spreader is available it can be driven astride the beds and the manure applied to a strip about 4 feet in width along the center of the bed. Where the land is not bedded the rows may be laid off in one direction and the manure applied with the spreader in the strip where the row is to be located.

Another method is to lay off the rows with a turnplow or a middle burster and then apply the manure in the furrows, spacing the small piles the correct distance for the hills (fig. 20), after which the turnplow is again used to form a slight bed over the manure. In some cases the land is first marked to indicate the distance between hills, after which the furrows are opened in the opposite direction and the manure hauled with wagons and placed in the furrows at the intersections. If the available quantity of manure is only 4 tons or less per acre, the best results will usually be obtained by applying it in the hills. Poultry and sheep manures are sometimes mixed with the soil in the hills, but as both are highly concentrated they should be used sparingly and thoroughly mixed with the soil.

Commercial fertilizers are almost indispensable for growing muskmelons on a large scale, the composition and quantity of the fertilizer depending upon the character of the soil. As a rule, a fertilizer containing 4 to 5 per cent nitrogen, 8 to 10 per cent phosphoric acid, and 4 to 6 per cent potash may be profitably used in quantities varying from 400 to 1,400 pounds per acre, the composition and quantity depending largely upon the previous cropping of the land. On soils that have been highly fertilized the previous season or on those that have grown alfalfa or a heavy crop of velvetbeans, cowpeas, or clover, 600 pounds will usually be sufficient. The nitrogen content

of the fertilizer may be a little lower on lands that have grown leguminous crops during preceding years, but on land that has not been manured or upon which legumes have not been grown recently at least 800 pounds of a complete fertilizer will be required. Some of the best melon growers in the Maryland, Delaware, and New Jersey section follow the practice of applying 600 pounds of fertilizer to the acre either sown broadcast or in a strip 2 to 4 feet wide along the rows when preparing the land, following with two side dressings of 200 to 300 pounds each during the growing season. The first side dressing is drilled about a foot from the plants just when the vines begin to run, and the second is applied at the time of the last cultivation, when the vines have to be turned for the application of the fertilizer. In all cases it is extremely important to spread and mix the fertilizer thoroughly with the soil, so that the feeding rootlets will acquire it gradually.



FIGURE 20.—Manuring land on which muskmelons are to be planted in hills

Many growers follow the practice of scattering a small handful of fertilizer where the hill is to be made, in addition to the regular broadcast application. Some growers also place about a teaspoonful of nitrate of soda in the hills 3 or 4 inches from the young plants shortly after they come through the ground, to give them a quick start and get them beyond the tender stage. The heavy application of nitrate of soda as a top-dressing late in the growing season is not recommended, however, as it may cause the vines to make a rank growth and produce melons of poor shipping quality.

METHODS OF PLANTING

Two general systems of starting the muskmelon crop are practiced. By the first and almost universal method the seed is planted in hills or drills in the field where the crop is to be grown. The second method involves the use of greenhouses, hotbeds, or sash-covered frames for starting the plants and their transfer to the field when weather conditions are suitable. This method is adapted for small acreages only, especially where earliness of maturity is important.

Field practices in the planting of muskmelons vary considerably with the locality and climatic conditions. In the western or irrigated sections the practice of growing on raised beds is almost universal. The beds are run east and west, usually 6 to 8 feet wide, with a rather deep irrigation furrow between, made by back-furrowing with a turnplow. Following the plowing the tops of the beds are harrowed smooth to form a dust mulch, and a V-shaped furrow is run along the south edge of each bed to form a seed bed. A moderate stream is then run down the irrigation furrow to establish a planting level. The seeds are planted in hills 3 to 5 feet apart slightly above the water level, following which the hills are usually covered with transparent paper for protection. By planting along the south side of the beds the young plants get the full effect of the sun and are protected from the north winds. High beds have the advantage that the vines and melons are above the water level during irrigation.

Muskmelon growers of southern Georgia plant on beds 5 to 7 feet in width, to provide better drainage and freedom from surface water after heavy rains. As a rule, the Georgia growers plant in hills spaced about 5 feet apart in the center of the beds, but in some cases the seed is planted in a continuous row by means of a drill, the seedlings being afterwards thinned to a single plant every 2 or 3 feet in the row. On land that is rolling and liable to wash during heavy rains the beds are frequently arranged so as to follow the contour of the hillsides, each bed and intervening furrow serving as a terrace and drainage channel. Under this method of culture the hills are seldom checked, and cultivation is in one direction only.

Where level culture is practiced, as in most of the North-Central and Northeastern States, the hills are usually checked and the melons cultivated in both directions during the early part of the season. By spacing the rows 7 feet and the hills 4 to 6 feet apart in the rows, cultivation can be continued in one direction after the vines have formed matted rows. Where systematic spraying of the vines every week or 10 days is practiced the melons are trained so that a roadway every few rows is kept open for the passage of the sprayer. In some cases every sixth or seventh row is made wider than the others, to provide a roadway for the spray outfit, these open spaces serving as roads when gathering the crop.

With the hills 5 feet apart in each direction there will be 1,740 hills to the acre. Where they are 5 by 6 feet apart there will be approximately 1,452 hills. Spacing at 5 by 7 feet will give 1,240 hills, while 5 by 8 feet provides for about 1,090 hills to the acre. The most common planting distance is probably 5 by 7 feet.

A pound of muskmelon seed is sufficient for planting an acre, although many growers provide 2 pounds. An ounce of muskmelon seed of average size contains 850 seed, 13,600 to the pound. At the usual planting distances this will provide about 10 seeds for each hill—a sufficient number.

In the western sections, where large acreages of muskmelons are grown, seeding is frequently done with horse-drawn gang planters, planting four rows at once. In the eastern sections single-row planters are most commonly used, or the planting is done by hand with an ordinary hoe, the depth depending upon the character of the

soil and its moisture content. On irrigated lands and those soils that contain plenty of moisture the depth should not exceed 1 inch and on the light sandy soils $1\frac{1}{2}$ inches. Nothing is to be gained by planting before the soil is sufficiently warm. Where the hills are covered with transparent paper, as practiced in the Imperial Valley of California, the seed can safely be planted a little earlier than where no covers are used.

Greenhouses and hotbeds are used to a limited degree for starting muskmelon plants, especially in the intensive market-garden sections where land values are high and extreme earliness of the crop is desirable. By starting the plants under cover with artificial heat the melons can be ripened one to two weeks earlier and the period of production lengthened. The usual method of growing the plants is by means of manure hotbeds, flue-heated beds, or greenhouses. In numerous instances growers have constructed permanent concrete beds with hot-water heating equipment for general plant growing, including the starting of muskmelons. As only a moderate heat is required for starting muskmelon plants, a hotbed having about 8 inches of manure or one used for starting earlier plants may be used. Manure-heated beds are usually constructed 6 feet in width and covered with standard 3 by 6 foot hotbed sash. Difficulty in getting manure suitable for hotbeds has led many growers to adopt the flue-heated bed or small greenhouse for growing the plants.

Flue-heated beds are as a rule about 12 to 16 feet in width and 40 to 50 feet in length, with a brick or stone furnace placed underground at one end of the bed. Two, sometimes three, flues of tile or brick run the full length of the bed beneath the board floor and terminate in separate chimneys at the farther end. The sides of the bed are usually of 2-inch plank, and a framework of 1 by 3 inch lath is used to support the unbleached muslin or light canvas covering.

Veneer wood bands, paper plant bands, quart berry boxes, and small squares of sod are frequently used for starting the melon plants in the beds. In some cases no containers are used, but a layer of rich loam about 4 inches thick is spread evenly over the bed and slightly firmed. The surface is then marked about 5 inches each way and seven or eight seeds planted in each of the squares. When the plants are ready to transfer to the field the bed is watered and a knife run between the hills, cutting the soil into cubes that may be lifted by means of a square-pointed trowel. Veneer bands made of wood 4 by 4 by 3 inches hold their shape better than those made of paper. The sodding method is an old and very good one, but it involves more labor than is entailed by the use of the veneer or paper bands. The sod is cut into small squares 4 by 4 or 5 by 5 inches and $2\frac{1}{2}$ or 3 inches thick and placed close together in the bed with the grass side downward. A little fine sifted compost consisting of rotted manure and good loam is then worked into the root side of the sods, and seven or eight seeds are planted in each inverted sod.

Muskmelon plants grown in beds or greenhouses require careful attention to watering, ventilating, and thinning. A temperature of 70° to 75° F. should be maintained until the seeds germinate, after which a day temperature of 65° to 70° and a night temperature of 60° to 65° will be about right. Plenty of ventilation should be given, to keep the plants short and stocky. Toward the

end of the period that the plants remain in the beds the covers should be left off most of the time, to harden them to outdoor conditions. Greenhouses are not desirable for starting melon plants unless they are capable of being very freely ventilated.

Four to five weeks is the limit for keeping the muskmelon plants in the greenhouse or beds, and the time for sowing the seeds should be carefully determined with relation to the average frost-free date for the section. Nothing is to be gained by too great haste, and it is much better to have young and thrifty rather than overgrown plants ready for setting. Thinning the plants to three or four in a hill should be done as soon as they are up. After they are moved to the field and become established they are thinned to two plants in a hill. Missing plants may be replaced by carefully transplanting those removed from other hills, but a narrow trowel should be used and a small quantity of soil kept on the roots of the plants thus moved.

A warm calm day should be selected for shifting the plants from the beds to the field. The beds should be watered several hours in advance and the foliage allowed to dry. As the plants are lifted they are placed on boards or in trays, loaded into a cart or wagon, and hauled to the field. The land should be in readiness and marked in one direction, and the furrows in which to set the plants should be opened only as needed. In setting, it is customary to place the hills just a little below the general level of the ground, for protection; then later to fill in around the plants.

Plants of the Montreal muskmelon, which is grown in the Montreal district of Canada and also to a limited extent in Vermont, are started in hotbeds and later the frames removed, allowing them to remain where originally planted. By this method the vines make considerable growth in the frames and the necessary extension of season is thereby gained.

THINNING IN THE FIELD

Planted in the field by the ordinary method, muskmelons require careful thinning, as a much larger quantity of seed is used than is necessary. When the plants have a true leaf between the seed leaves they should be thinned to about four to a hill and in about a week or 10 days again thinned to two in a hill. In sections where the striped cucumber beetle is especially troublesome the final thinning is usually delayed until the plants are well established and have formed three or four true leaves. Where the plants crowd closely together in the hills they should be separated as much as possible in thinning; and if there is danger of disturbing the roots of the remaining plants, those that are removed should be cut off rather than pulled out. In continuous-row planting, the plants are finally left singly 2 to 3 feet apart in the row.

CULTIVATION

The cultivation of muskmelons should begin as soon as the rows of plants can be followed, and the soil should be loose and mellow and kept free from weeds until the spread of the vines makes further working impracticable. It should be borne in mind that the musk-

melon is a comparatively shallow-rooted plant and that the roots often extend farther than the vines. It is therefore essential that the land be worked shallow, especially near the hills and after the vines begin to run freely. Where the hills are carefully checked cultivation can be given in both directions during the early part of the season by means of a weeder or any shallow-working cultivator. Many growers work along the rows with a 1-horse walking cultivator or with a 2-horse riding cultivator and then break the middles with a harrow. When the plants begin to spread cultivation should be carried on in one direction and the vines kept trained in a more or less compact row. During the last cultivation the vines are sometimes turned back by hand, or a vine lifter is attached to the cultivator in order to work closer to the plants. At this time the second and final side dressing of fertilizer is applied and worked into the soil. Following the last cultivation the tips of the vines should be spread evenly in all directions and the growth allowed to cover the entire space between the rows.

Hand hoeing will be required early in the season while the plants are small and at intervals after the vines have begun to develop, in order to remove weeds that can not be destroyed in horse cultivation. About six workings with horse-drawn tools and two to four hand hoeings will be required to grow properly a crop of muskmelons.

NIPPING AND PRUNING VINES

Frequent inquiries are made by growers as to the advisability of nipping or pruning muskmelon vines with the object of increasing the set of fruit or of hastening its development. Early writers on muskmelon culture gave specific and detailed instructions regarding the nipping of the vines, this advice evidently being based upon European practices in connection with growing the crop under glass and in restricted areas. The theory of these writers was that the nipping of the main vine caused the early formation of the laterals on which the crown setting or first fruit is borne. The results of experiments conducted by the Illinois and New Hampshire Agricultural Experiment Stations show conclusively that there is little if anything to be gained from pinching or heading back muskmelon vines when grown out of doors under the conditions involved in their experiments.

Reducing the number of muskmelons on a vine will increase the size of those that remain, but in view of the fact that most varieties produce melons too large for a standard pack, the thinning of those on the vines will prove to be a loss rather than a gain.

POLLINATION

Growers frequently inquire why the early blossoms on their muskmelon vines do not set fruit. Muskmelon blossoms are of two kinds. The first blossoms to appear produce pollen only. Later the flowers bearing pistils and which produce fruits appear. This accounts for the failure of the first flowers to set fruit. At the base of the pistillate blossom is located the small undeveloped melon formed before

the blossom opened, and it is necessary that pollen be transferred by bees or other insects to the pistils of these flowers. In most varieties the flowers that produce the fruit contain both stamens and pistils, which are the male and the female parts of the flower. Where melons are grown in greenhouses or in closed frames it is essential that provision be made for the entrance of bees in order that the pollen be transferred.

IRRIGATION

Muskmelon vines require an abundance of moisture during the period when they are making the strongest growth and up to the time that the melons are full grown, but great care should be taken to avoid overwatering just preceding and during the ripening period. The deep rooting and vigor of the vines are possible only under conditions where the necessary moisture is supplied without oversaturation of the soil. In sections where furrow irrigation is practiced and



FIGURE 21.—Muskmelons growing on raised beds with irrigation furrows between the beds

the muskmelons are grown on raised beds and vines are kept upon the beds (fig. 21), the furrows remaining open, short heads and quick applications of the water, followed by drainage of the irrigation furrows, give the best results. Where it is necessary to irrigate before the plants are up, care should be taken that the flow does not go over the top of the hills but that the water soaks beneath the hills, leaving the surface dry.

In regions having normal or natural rainfall during the melon-growing season there are frequent periods during which irrigation proves to be a decided advantage. The water is sometimes applied by running a small stream in a shallow furrow along the rows, but more often by means of overhead or sprinkler irrigation systems. Here, again, a careful study of soil conditions and weather prospects is essential from the standpoint of both the cost and the effect of the water upon the growing crop. Where irrigation is followed by heavy rainfall the watering is often harmful, reducing the yield of marketable melons.

INSECT ENEMIES¹

Growers must be prepared to combat the insects that attack muskmelons. Of these the striped cucumber beetle and the melon aphid or louse are widespread and are the cause of serious damage to the melon crop in many States.

STRIPED CUCUMBER BEETLE

The striped cucumber beetle emerges from winter quarters in late spring or early summer and usually appears in the melon fields in vast numbers, often attacking the melon seedlings as they break through the ground, feeding upon the tender leaves and stems both below and above the surface, gaining access to the underground stem through the cracks in the soil. They are particularly active at this period and unless checked may destroy large plantings in a few days.



FIGURE 22.—Applying nicotine dust to melon hills by means of a dusting apparatus with a funnel attachment

To control the striped cucumber beetle the grower must be on the lookout for its first appearance. It is rather difficult to combat, but there are several methods that have been used to advantage. One of these is the use of nicotine dust, usually a combination of hydrated lime and nicotine sulphate. The nicotine contained in the dust acts as a fumigant and kills when brought in contact with the insect. A dust containing 2 per cent nicotine (5 per cent nicotine sulphate) applied at air temperatures above 70° F. has proved satisfactory. When

the dust is applied directly to hills of small melons 15 to 20 pounds is sufficient to cover an acre. The best results are obtained by timely dustings, and the first application should be made as soon as the beetles are observed, which is about the time early plantings appear above the ground, followed by as many treatments as may be necessary to prevent further injury. Instructions on the preparation of nicotine dust are given in Farmers' Bulletin 1499.²

Dusting young melons with hand-operated dusters having a galvanized cone attached to the outlet pipe (fig. 22) has proved to be both effective and economical. In operation the cone is placed over

¹ Prepared by W. H. White, Entomologist, Truck-Crops Insect Investigations, Bureau of Entomology, U. S. Department of Agriculture.

² CHITTENDEN, F. H., and WHITE, W. H. THE MELON APHID AND ITS CONTROL. U. S. Dept. Agr., Farmers' Bul. 1499. 17 p., illus. 1926.

the hill, the duster operated, and the cone allowed to remain over the hill for a few seconds, thus preventing the beetles from escaping while the dust is concentrated upon the hill.

The muskmelon growers of the Hurlock district, on the Eastern Shore of Maryland, apply nicotine dust to young melon plants by the use of small hand box dusters (fig. 23). The box portion of this duster is 8 or 10 inches square on the outside and 12 inches deep; inside of this is suspended a close-fitting cheesecloth or burlap bag from which a small quantity of the dust is sifted upon and around the young plants as the box is dropped down over the hill, thus completely trapping the insects. As the operator walks along the row the duster is dropped over each hill and allowed to remain a second or two. Then it is moved to the next hill, with only a short pause in the stride of the operator. Tightly covered cans containing a supply of the dust from which to replenish the small dusters should be placed at convenient points in the melon field. One man will cover from 8 to 10 acres a day with one of these hand dusters.

The University of Maryland² has devised a box fumigator which has been used with success in treating young melons with nicotine dust for the control of the striped cucumber beetle. The box is constructed of light wood 12 or 14 inches square and 10 inches deep, with the bottom open and the top closed by a hinged lid. Two uprights with a crosspiece at the top are attached to the sides of the box, to form a handle. The dust is suspended in the box by means of a piece of burlap fitted across and extending down to within 4 inches of the lower edge.

In operation, 12 of these fumigator dusters are placed one each over the first 12 hills of melons at one corner of the field. As soon as the 12 boxes are in position the operator returns to the starting point and moves them, one at a time, to the adjacent row. About two minutes will be required to make the change, during which the dust and the gas are concentrated and kill a high percentage of the insects. If there is no loss of time one man will fumigate from 360 to 420 hills of melons in an hour by this method.

In some sections good control of the striped cucumber beetle has been obtained by the use of a dust consisting of 1 part of calcium

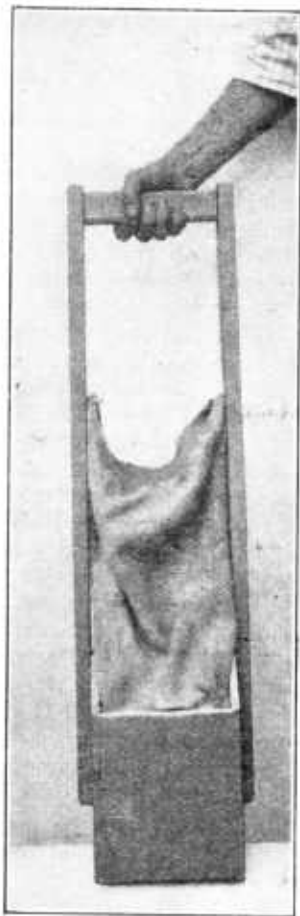


FIGURE 23.—Box duster for applying nicotine dust for control of striped cucumber beetles on muskmelon plants

² CORY, E. N., and POTTS, S. F. THE CONTROL OF TRUCK-CROP PESTS BY DUSTING. Md. Agr. Exp. Sta. Bul. 261, p. 121-155, illus. 1924.

arsenate to 15 to 20 parts of gypsum or land plaster. In the use of this material it is necessary to keep the plants fairly well covered with the dust from the time that they appear above ground until they have reached the runner stage, in order to protect the new growth. At this period in its growth the plant is usually able to withstand the attack of the beetle. Spraying with Bordeaux mixture and lead arsenate will also protect the plants.

The spotted cucumber beetle sometimes becomes a serious pest of the cucumber. It is more difficult of control than the striped cucumber beetle, but the measures recommended for the latter pest will give some relief.

MELON APHID

The melon aphid is a small louselike insect which obtains its food by sucking the plant juices. It feeds on the under side of the leaf and when abundant causes the leaf to curl, lose color, and finally die. Infestation of melon fields is started by winged females, which fly from other food plants. They start in the early summer as small colonies on the under side of the leaf. Unless checked they soon spread over the entire plant and thence to adjoining hills until the whole field is infested.

To combat the melon aphid successfully a close inspection of the fields should be made from time to time, in order that the first appearance of the insects may be noted and means taken to check their spread. Unless this is done, the infestation may become so widespread and severe that control measures will be of little value.

Nicotine dust containing 3 per cent actual nicotine used at the rate of 30 to 40 pounds per acre on fully grown plants will control this pest. For the best results the dust should be applied when the air temperature is above 70° F. and when the foliage of the plants is dry. A hand duster may be used with success on small areas and the dust applied in such a manner that it will reach the under side of the leaves. Plants immediately adjacent to those heavily infested should also be dusted in order to kill any aphids that may have spread from the original colony. Where the infestation has become general and the area is large, power or traction dusters may be used to advantage.

Spraying with nicotine sulphate to control the melon aphid has been found effective when the solution is made as follows:

Nicotine sulphate (40 per cent nicotine)-----	$\frac{3}{4}$ pint.
Soap (laundry or fish-oil soap)-----	2 to 4 pounds.
Water-----	50 gallons.

For small quantities, use 1 teaspoonful of nicotine sulphate and 2 ounces of soap to 1 gallon of water.

The object of the soap is to make the spray spread evenly over the foliage, and more soap is required for hard water than for soft. In case the spray draws together in small globules, leaving uncoated areas on the foliage, more soap should be added. It must be borne in mind that it is essential that the spray or dust actually strike the body of the insect.

For further information on the control of insects injurious to the melon crop, write to the Bureau of Entomology, United States Department of Agriculture.

DISEASES AND THEIR CONTROL⁴

Muskmelons are subject to a number of diseases that may be either avoided by planting on clean land or losses from them reduced by seed treatment or by spraying or dusting.

Root knot⁵ is caused by minute eelworms, or nematodes, which attack the roots of muskmelons and many other garden crops in certain sections of the country, producing swellings, or galls, upon the roots, which cause dwarfing of the plants and prevent the maturing of good crops. This trouble is often very serious in the sandy soils of the South but is rarely of importance in the North. Crop rotation and the planting of melons only on land free from nematodes are the best methods of control now known.

Bacterial wilt is a fairly common disease of muskmelons and is caused by bacteria plugging the water vessels of the roots, stems, and leaves. This disease is similar in appearance to the wilting caused by lack of water, though it usually appears more suddenly and may affect only one runner of the plant. Death of the plant soon follows this wilting, and sometimes serious losses result. The bacterial wilt organism does not live in the soil but is carried over winter by the striped cucumber beetle and is spread from plant to plant by this insect and possibly by other insects. Rigid control of these insects by methods given on page 22 will materially aid in controlling wilt. In addition, wilted plants found early in the season should be promptly pulled and burned or buried.

Mosaic is a widespread and often serious disease of muskmelons, characterized by mottling, yellowing, and curling of the leaves, dwarfing of the plants, and reduction in the number, size, and quality of the fruits. Like similar mosaic diseases of other plants, it is caused by a virus which is spread in the juice of diseased plants, carried by insects—chiefly striped cucumber beetles and aphids—and by the pickers. It is carried over winter in the seeds of the wild cucumber and in the perennial rootstocks of milkweed, pokeweed, and other plants, but not, so far as known, in the seeds of the muskmelon. The best control measures known include the prompt removal of young diseased plants, the digging up and burning of wild cucumber vines, milkweed, pokeweed, and other overwintering host plants in and near the melon fields, and the control of the insects that spread the disease.

Three important diseases—anthracnose, downy mildew, and blight—all ordinarily called "blight" or "leaf spot," may attack the muskmelon when weather conditions are favorable, frequently resulting in heavy losses. All three diseases are caused by fungi. They often develop and spread rapidly in moist warm weather and are characterized by brownish more or less rounded or angular spots, which enlarge and soon cause the leaves to turn yellow, curl, dry up, and die. The stems are likewise attacked and the plants prematurely killed. One of these diseases—anthracnose—also causes sunken decaying spots on the fruits. Melons from fields severely

⁴ Prepared by W. W. Gilbert, senior pathologist, Office of Horticultural Crops and Diseases, Bureau of Plant Industry.

⁵ Growers who are suffering losses from root knot on melons or other crops should consult GODFREY, G. H. ROOT KNOT: ITS CAUSE AND CONTROL. U. S. Dept. Agr., Farmers' Bul. 1345, 27 p., illus. 1923.

attacked in midseason by any of these troubles are usually undersized and lacking in sweetness and juiciness.

Crop rotation, seed treatment, and spraying are important means of reducing losses from anthracnose, downy mildew, and blight. Muskmelons should not be planted on or adjacent to land where diseased vine crops were grown the previous year, as the causal fungi of two and possibly all of these diseases live over winter in the soil. As a precaution against seed transmission of these diseases, especially anthracnose, the seed should be treated for five minutes in a 1 to 1,000 mercuric-chloride solution, followed by thorough washing in water. Spraying the vines with Bordeaux mixture will materially check the development of all three diseases, often permitting the harvesting of a profitable crop.

Dusting with copper-lime fungicidal dusts is being tested, in some instances with good results, but it is still in the experimental stage. Its principal advantages are quicker and easier application; its main drawbacks are the greater cost of material and in some instances reduced effectiveness in disease control.

Spraying is a preventive rather than a cure for fungous leaf diseases. Successful control is secured only when the work is started early in the season before the diseases appear and is done carefully and thoroughly with a high-pressure pump, so that all parts of the plants are coated with a fine mist of the fungicidal spray mixture. It is essential also that the Bordeaux mixture should be properly made and applied at intervals frequent enough to cover the new growth promptly.

For spraying, where any considerable acreage is involved, a power outfit should be used and a Bordeaux mixing platform constructed. A convenient method is to erect a wooden platform large enough to hold at least six to eight barrels and high enough to permit the solutions to run by gravity from the mixing barrels into the sprayer tank. It should also be near an ample supply of water. Stock solutions of copper sulphate (bluestone) and lime should be made in separate barrels, the usual strength being 1 pound to the gallon. To make up 100 gallons of 4-4-50 Bordeaux mixture, place 8 gallons of bluestone stock solution in a 50-gallon barrel and fill it with water. Likewise, after thorough stirring place 8 gallons of lime stock solution in a second 50-gallon barrel and fill with water, and by means of pieces of hose connected to the bottoms of the barrels allow the two solutions to run together through an 18-mesh copper-wire strainer into the spray tank. Thorough mixing of the two dilute solutions gives the best Bordeaux mixture. It should be used immediately, as it deteriorates with age.

A simplified method of making Bordeaux mixture is being used to a considerable extent, apparently with good results. It appeals to many growers because of the fact that no mixing platform is required and only sufficient barrels to hold the stock solution, unless water storage is necessary. By this method of making 100 gallons of 4-4-50 Bordeaux mixture, 8 gallons of stock solution of lime (or 12 pounds of hydrated lime) are put directly into the sprayer tank, which is then filled three-quarters full with water and the agitator run to mix it thoroughly. Eight gallons of copper-sulphate stock solution are then added and the tank filled with water. In some instances a weaker Bordeaux mixture (2-4-50) is recommended,

particularly in localities where vine injury has resulted from the stronger solution.

The first spray application should be made when the plants are small, before or just as soon as the very first signs of disease appear. Other spray applications should follow at intervals of 7 to 10 days in rainy weather and 10 days to 2 weeks in hot dry weather until the melons are harvested. A similar schedule should be followed if dusting is used.

GATHERING AND HANDLING

The successful marketing of muskmelons depends largely upon careful gathering and handling. As the time for the ripening of the melons approaches, the vines of about every tenth row should be laid carefully together (fig. 24) to form roadways for the wagons or trucks, which are driven astride of these rows. Where every seventh to tenth row has been spaced wider in planting than the others in order to accommodate the spray outfit, these spaces are used



FIGURE 24.—Laying muskmelon vines together, so that wagons or trucks can be driven astride of the row

as roadways for hauling the melons. In some cases the vines of two adjoining rows are turned to form a roadway between the rows.

Various types of wagons are used for hauling the melons from the field to the packing shed or to the shipping station. In orchard sections the flat-top orchard wagons when available are frequently employed, but more often the work is done with ordinary farm wagons provided with bolster springs. In all cases where melons are hauled in bulk the wagon beds should be provided with a layer of straw 3 to 4 inches deep and the sides padded with several thicknesses of burlap securely nailed over the edges to prevent injury to the melons. The use of small motor trucks for handling the melons is becoming more common, and these as a rule can be driven through the melon fields with less injury than from teams and wagons.

Observations show that a considerable percentage of the muskmelons shipped to the principal markets of the United States are picked too green and that the sale of muskmelons is injured through the marketing of these immature melons. The experience of the best growers and dealers, as well as tests conducted by the Depart-

ment of Agriculture, show conclusively that muskmelons do not attain their highest flavor and best edible qualities unless allowed to become reasonably ripe on vigorous disease-free vines. Careful transportation experiments⁶ have shown that muskmelons grown in the Imperial Valley of California to be shipped under refrigeration to the most distant eastern markets of the United States may remain on the vines until ripe enough for the stems to separate from the melons under a decided pressure of the thumb and yet reach the consumer in excellent condition. Two stages of maturity were included in these experiments, the one known as "full slip," illustrated in Figure 25, by which the entire stem separates from the melon, leaving a clean stem cavity, and the other, known as the "half slip," illustrated in Figure 26, by which about one-third of

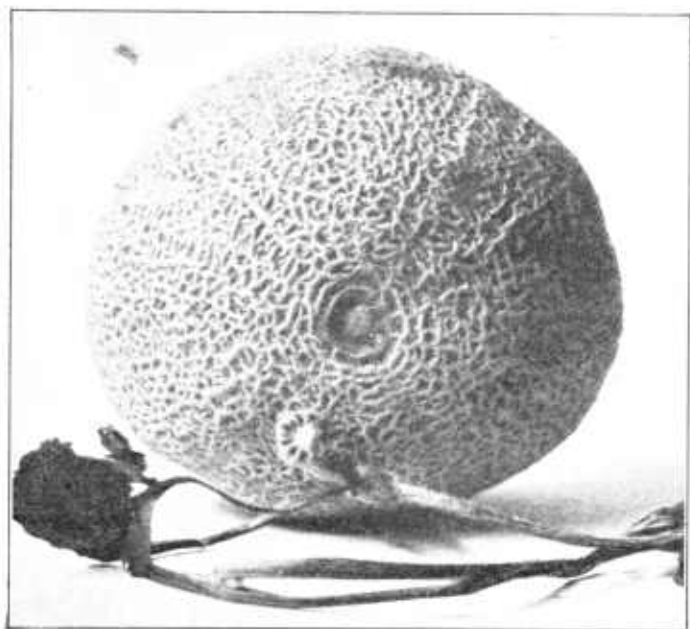


FIGURE 25.—An illustration of the term "full slip" used in picking muskmelons. Note how the stem pulls away from the melon, leaving a clean, cuplike hole

the stem remains attached to the melon. In both cases the melons were full netted, and the background color had changed from a green or cucumber tinge to a slightly lighter color, but in no case yellow. In the shipping test already referred to, the melons were in transit 14 days to New York under refrigeration and did not ripen to any extent during that period. Those that were picked at the full-slip stage were in prime condition for eating on their arrival in New York, whereas those in the half-slip stage required a longer time to reach prime condition, and such prompt handling was not necessary. The claim made by growers that the melons must be gathered before they will separate from the stems has been

⁶ MCKAY, A. W., FISCHER, G. L., and NELSON, A. E. THE HANDLING AND TRANSPORTATION OF CANTALOUPE. U. S. Dept. Agr., Farmers' Bul. 1145, 20 p., illus. 1921.

responsible for the stocking of the principal markets with muskmelons of poor flavor and inferior eating quality. The shipment of full-slip melons, however, calls for very prompt and careful handling, and it is recommended only for production areas that ship under refrigeration or that can place their product in the hands of the consumer within 48 hours from the time of picking in case refrigeration is not provided.

Muskmelons picked at the half-slip stage are generally ready for eating in 36 to 48 hours after reaching the market, depending on the method of transportation and the weather conditions. For example, the melons that were 14 days on the way from California under refrigeration probably suffered less exposure in transit than shipments without refrigeration from the Eastern Shore of Maryland,

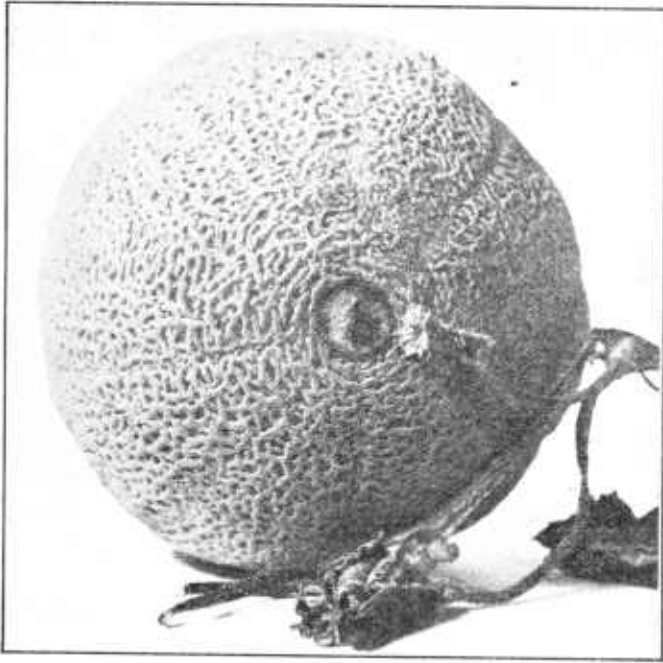


FIGURE 26.—A muskmelon picked on half slip. Only a part of the stem has slipped from the melon easily, leaving the depression on the right side, the other part having broken. As a rule, this condition signifies a less degree of ripeness than the full slip

which normally arrive in New York within 24 to 30 hours from the time they are gathered. It is desirable for the melons to reach on the vines the greatest degree of maturity that is consistent with the method of handling; but there is always the danger of overstocking the markets with soft melons, particularly at the end of the picking season, when the melons ripen rapidly. In order to satisfy the consuming public with melons of high quality it should be the aim of every grower and shipper to place upon the table of the consumer the type and quality of melon that he would want upon his own table.

At the beginning of the picking season the melons should be gone over about every other day for the first week and every day the second week. Toward the end of the season the picking becomes

continuous, and the oftener the vines are gone over and the ripening melons gathered the better. The first melons mature slowly, and as the season advances the ripening becomes more rapid, but their maturity can be readily determined by the ease with which they separate from the stems. Experienced pickers soon learn to recognize the stage of ripeness by the general appearance of the melons, mainly the background or skin color beneath the netting, and after one or two pickings are able to judge almost entirely by external characteristics.

The proper method of removal from the vine is to place the hand upon the melon, pressing upon the stem with the thumb or slightly



FIGURE 27.—Packing muskmelons in the shade of a tree at the side of the melon field

lifting the melon from the ground. If the melon is sufficiently ripe the stem will separate under the pressure, showing that the melon is ready for gathering. Hampers, bushel baskets, crates, lug boxes, and numerous other types of containers are used for carrying the melons to the roadways. In most cases no picking containers are used, the melons being laid in piles. Canvas bags with shoulder straps are used extensively, but their tendency to bruise the melons is greater than that of baskets or crates. As a rule the melons are left in the picking baskets at the roadways until they are loaded into the wagons, and they are usually hauled to the packing sheds in these containers.

Following the picking, the crates or baskets containing the melons are loaded on wagons or trucks driven through the fields. Where the melons are placed in piles two men work on the ground and toss the melons to men or boys, who place them in bulk in the bed of the wagon or truck. This practice is objectionable, and the handling of the melons in field baskets or crates is recommended. After the melons are gathered no time should be lost in removing them to the packing shed, as exposure to the heat of the sun in the field causes them to soften very rapidly.

In the past, grading and packing the melons has been done in the shade of a tree, as shown in Figure 27, or under a temporary shed constructed of boards or of poles and tree branches, located at some

convenient point in the melon field, as shown in Figure 28. During recent years there has been a rapid development of the central packing-shed idea. By this method a suitable building is provided at a convenient point, usually on a railway siding, and the melons are hauled from the field to this shed, where they are graded, packed, and loaded direct into the cars. There is much to recommend this plan, as a more uniform grade and better pack can be had than where the work is done in the field. Where melons are handled by trained workers under the direction of a competent superintendent, the necessity for hauling the shipping crates to the farms and back again to the shipping point is eliminated, and as a rule the packing can be done at lower cost than on the farms. Where the melons are hauled any considerable distance from the field to the packing shed they should be protected from the sun with a canvas wagon cover. As the wagons or trucks arrive at the packing shed the melons are unloaded as near as possible to the grading tables. In case the melons are hauled in bulk, the packing shed should be so arranged that the melons can be placed directly on the grading tables or on a traveling belt which will convey them to these tables. Usually the



FIGURE 28.—Temporary packing shed constructed at one side of a muskmelon field

graders work on the receiving side of the table, where the melons come from the wagons, while the packers are on the opposite or car-loading side, and the crates as packed are shifted from the packing table to low benches, where the covers are nailed on. The efficiency of a melon-packing shed depends largely upon the proper arrangement of the equipment and the organization of the working force. The apportionment of labor should be such that all hands are continuously at work and the melons are kept moving steadily toward the refrigerator car from the time they are received from the field wagons or trucks.

GRADING AND PACKING⁷

Muskmelons are shipped to the markets of the United States in a variety of packages, but those grown in California, Colorado, and

⁷ Detailed information on this phase of the subject may be found in the following: MORE, C. T., and BRANCH, G. V. THE COMMERCIAL GRADING, PACKING, AND SHIPPING OF CANTALOUPE. U. S. Dept. Agr., Farmers' Bul. 707, 26 p., illus. (Rev.) 1918. MCKAY, A. W., FISCHER, G. L., and NELSON, A. E. THE HANDLING AND TRANSPORTATION OF CANTALOUPE. U. S. Dept. Agr., Farmers' Bul. 1145, 20 p., illus. 1921.

Arizona are shipped in crates known as standard, pony, and flat. The standard crate (fig. 29) is 12 by 12 by 22½ inches; pony crates are, as a rule, 11 by 11 by 22½ inches; and flats (figs. 30 and 31) are 4 or 4½ by 13 by 22½ inches, inside measurement. In the East,

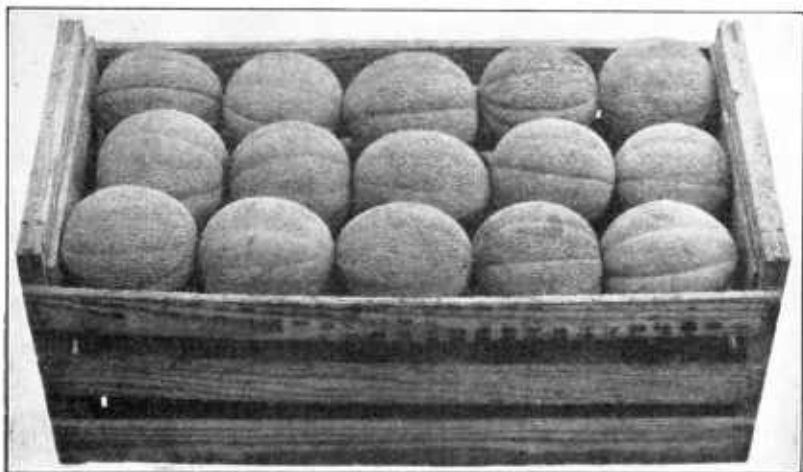


FIGURE 29.—Standard crate containing 15 muskmelons: standard grade and pack

where no standard crate dimensions have been adopted, there is considerable variation from the above. Crates used by the western growers are usually constructed with solid ends and sawed slats,

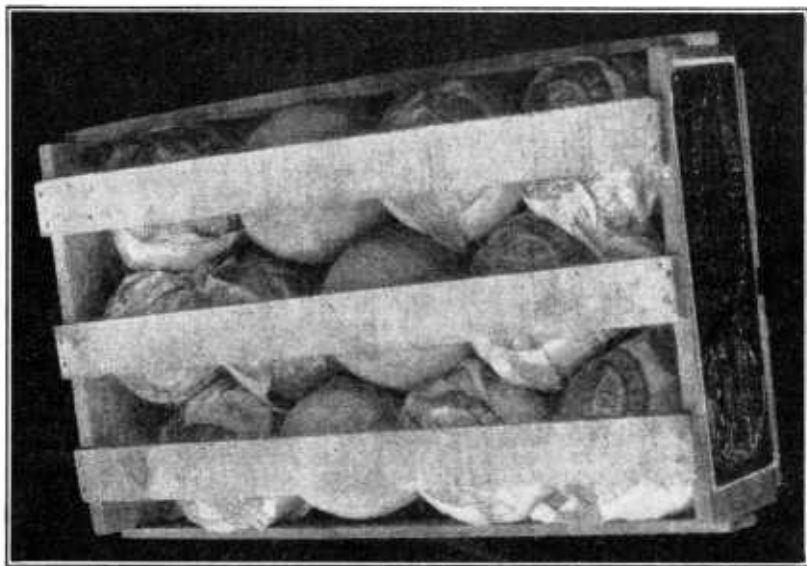


FIGURE 30.—Standard flat crate holding 9 to 15 muskmelons

while those used by the eastern growers have paneled ends and either sawed or veneer slats. In southeastern Virginia and a number of other sections along the Atlantic coast, where the size of the melons

grown is usually larger than those of the Western States, a crate similar to a 32-quart berry crate, as illustrated in Figure 32, is often employed. The famous Montreal Market muskmelons are shipped in a special type of basket and packed in excelsior or in hay, as shown in Figure 33. Honeydew and Casaba melons are shipped in various sizes of flat crates. However, two sizes are now being adopted, these being $6\frac{1}{2}$ by $16\frac{1}{2}$ by $22\frac{1}{2}$, known as the standard, and $7\frac{1}{2}$ by $16\frac{1}{2}$ by $22\frac{1}{2}$, known as the jumbo. In some of the Eastern States a 12-quart Climax basket, shown in Figure 34, is used. Hampers and bushel baskets are used to a considerable extent for local marketing.

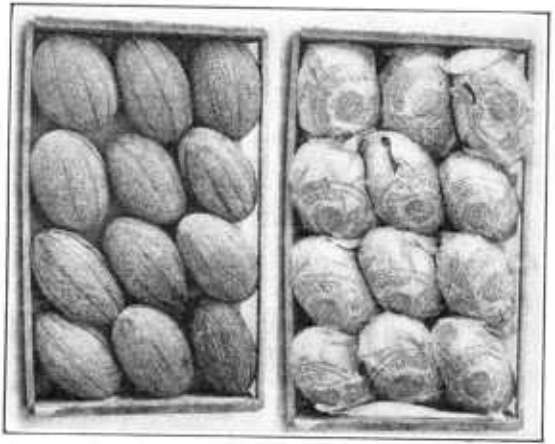


FIGURE 31.—Burrell Gem muskmelons packed in flat crate, wrapped and unwrapped



FIGURE 32.—Crates used by growers in the Norfolk (Va.) section for shipping muskmelons

The large markets of the United States have come to recognize a pack consisting of 45 melons to the standard 12 by 12 by $22\frac{1}{2}$

inch crate. To make this pack it is necessary that the melons be 4 or not exceeding $4\frac{1}{2}$ inches in diameter and 4 to $4\frac{1}{2}$ inches in length. This pack (fig. 29) has a depth of three layers, each layer containing three rows of five melons each, the melons being placed end to end and completely filling the length of the crate. Slightly larger melons are often packed 36 in the standard crate. Extra large melons (over 5 inches in diameter) are usually packed in jumbo crates, the arrangement varying according to the size and shape of the individual melons. (Fig. 35.) The jumbo packs may consist of 36, 33, 27, or 24 melons, according to their size. In many sections the pony crate is not used, but the small melons are packed 54 to 60 to a standard crate, and when too small to pack 60 are as a rule discarded. Flat crates are packed with 9, 12, or 15 melons to a crate, according to the size of the individual melons.



FIGURE 33.—Montreal Market muskmelons packed in special willow baskets

Certain growers in the eastern Maryland and Delaware district are using a special crate 9 by $13\frac{1}{2}$ by $19\frac{1}{2}$ inches, inside measurement, or 10 by 14 by 22 inches on the outside. A special bushel basket having straight sides and a removable bottom, which is packed from the bottom by inverting on the packing table, is also being used in the eastern section. The growers using this special basket report that it is easy to pack and adapted for handling melons that vary in size. These containers are shown in Figure 36.

In all cases the pack should be snug and the package so full that it will have a slight bulge to allow for shrinkage in transit. Melons that are slack packed will shift about during handling, become bruised, and invariably sell at a discount when they reach the market. As rapidly as the crates are packed they should be loaded into refrigerator cars or upon a wagon or truck and sent to market in the shortest possible time. When the packing is done under field shelters the melons should be protected from the sun at all times

and especially after they are graded and packed in the shipping crates.

Wrapping individual muskmelons in tissue paper before packing them in the crates for shipment gives the package an attractive appearance but is not advisable, as the paper interferes with the cooling of the melons in the refrigerator car and often causes them

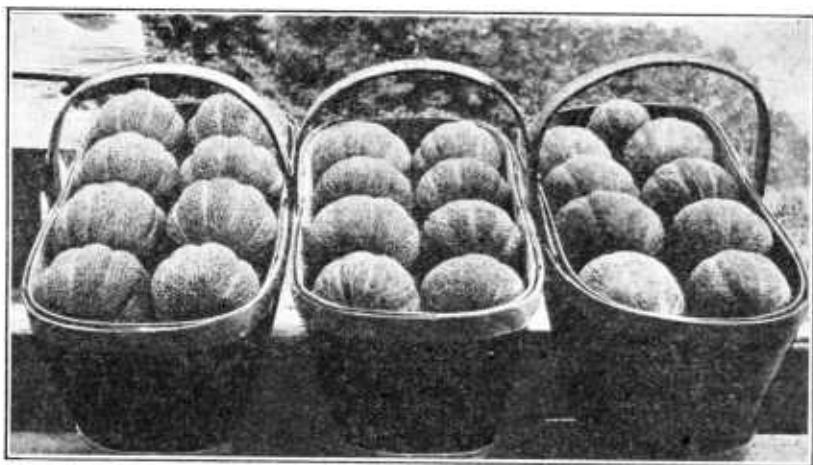


FIGURE 34.—Twelve-quart Climax baskets occasionally used in the Eastern States for marketing muskmelons locally

to mold in transit. Melons that are well netted, clean and smooth, and packed in neat, attractive crates present the best possible appearance on the markets. The use of well-designed colored labels on the ends of the crates adds materially to the appearance of the package, but the color work on these labels should not be overdone and the label should not misrepresent the contents of the crate as to variety,

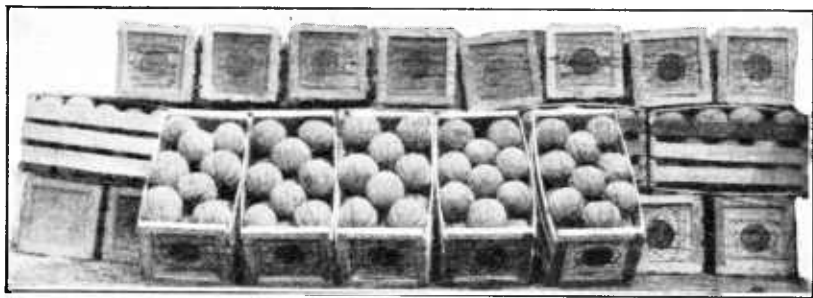


FIGURE 35.—Miscellaneous or jumbo packs of muskmelons

grade, or the locality where grown. In a few shipping sections it is the practice to place a small sticker of paper upon each melon. This is good advertising but involves considerable extra labor; besides, every time the individual melons are handled, the liability to injury is increased. Rough handling must be avoided all along the line and especially after the melons are packed in the crates.

SELLING MUSKMELONS AT ROADSIDE AND LOCAL MARKETS

The development of motor transportation and the increase in automobile travel have created an excellent opportunity for the local production and sale of muskmelons. By means of truck transportation markets 40 to 60 miles from the point where grown can be supplied with vine-ripened melons of high quality. Roadside markets, if properly conducted, soon gain a patronage that will take care of a considerable acreage of melons and are often established temporarily on main-traveled highways for the sole purpose of handling a melon crop. Where these markets are more or less permanent and handle other farm products the melons can be made special during their season. One melon grower, whose roadside market is shown in Figure 37, follows the practice of leasing suitable acreage, usually

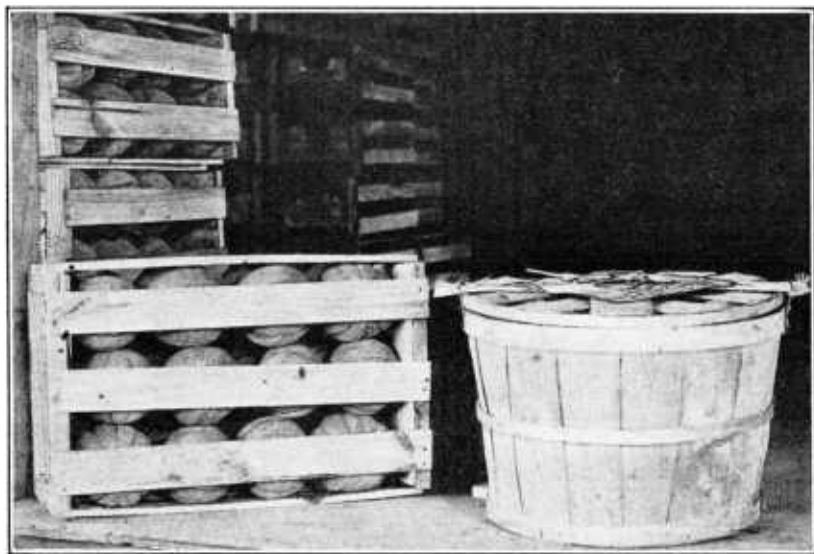


FIGURE 36.—Special crate and bushel basket used for shipping muskmelons in eastern Maryland

bluegrass or clover sod, located within a mile of a central point on the main highway, where his market is established during the period that the melons are to be sold. The plan followed by this grower is to plant only on land that has not been in melons for a number of years, to spray regularly, and to produce high-class melons. Two small motor trucks are used for hauling the melons from the fields to the market, where they are graded and displayed in bins that face the roadway. In addition to the sales that this grower makes to the many automobilists that pass, his best customers drive from the city primarily to obtain a supply of melons of fine quality, and they usually buy in considerable quantity, including those that are fully ripe and some that will keep for three or four days. No packages are required for the sale of the melons, as the customers usually bring baskets with them. A few bushel baskets and hampers are kept on hand and are sold to any customers who desire them. The

melons as displayed upon the tables (fig. 38) are graded according to size and freedom from defect, a difference of 5 cents being usually made between the grades. The prices during the height of the season as a rule range from 15 to 30 cents each and are considered very reasonable for melons of the size offered.

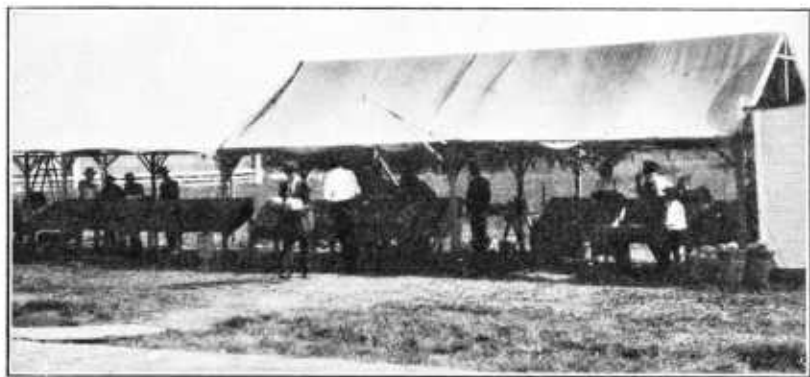


FIGURE 37.—Temporary roadside market used exclusively for selling muskmelons grown in near-by fields

In Indiana, Ohio, and other of the North-Central States great quantities of muskmelons of the Tiptop and Ohio Sugar varieties are sold from trucks and wagons on the eurb markets. These melons are frequently very large, of excellent flavor, and find a ready sale.



FIGURE 38.—Muskmelons displayed at a roadside market

YIELDS AND RETURNS

Yields of about 200 standard crates of muskmelons per acre are not exceptional, but yields of 135 to 145 standard crates are more common. In sections where the largest types of muskmelons, such

as Tiptop, Ohio Sugar, Surprise, Early Hackensack, and Montreal Market, are grown, a smaller number of individual melons are produced, but the total on the basis of standard crates is about the same.

Estimates of the cost of growing and loading on cars a standard crate of muskmelons have ranged from 70 cents to \$1.50. Land rents in the California district above mentioned ranged from \$30 to \$60 an acre.

Prices obtained for muskmelons vary according to supply, demand, and quality. The proportion of the total receipts that may be figured as net returns varies greatly, but at best the net proceeds from a crop of muskmelons is not great. Small acreages near a good local market or where the melons are retailed at a roadside market give the highest returns per acre.

The large markets are now well supplied with muskmelons of medium to fair quality, but there is an excellent opportunity for the development of local markets within easy truck haul and for the sale of muskmelons of good quality at roadside markets.